

Homework 3

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Due April 3

(Read Note 1 ~ Note 5 of Homework 2 before proceeding to the homework problems.

Note that the due date for this homework is Wednesday, not Monday. The due date has been extended so that CS students taking this course can participate in the CS Department MT in the week.)

Consider a telephone book that contains telephone number entries where each telephone number entry consists of the name of a person, the telephone number of the person and the name of the group to which the person belongs. Typical groups are family, friends, relatives, students, professors, etc.

Telephone book has the following operations:

- Add a telephone number
- Remove a telephone number

1. Make a precise specification of the above telephone book as an ADT.
2. Implement the specification using the singly linked list.
3. Implement the specification using the doubly linked list.
4. Compare the complexity of the two implementations above with respect to the two operations for the telephone book ADT. This should be done at two levels: one in terms of the number of executed instructions and two in terms of big Oh. Is one implementation better than the other? Explain why.

===== Implementation Constraints =====

Your program *must* print out the output as shown below.

- Add a telephone number

Input must be [*Phone number*]:[*Person Name*]:[*Group Name*].

If succeed, "Telephone number has been successfully added."

or else, "Telephone number already exist."
or other, "Given input format is not correct."

Case 1: normal case

| | |
|--------|---|
| Input | add 010-1234-5678:Alice:family |
| Output | Telephone number has been successfully added. |

Case 2: redundancy case

| | |
|--------|------------------------------------|
| Input | add 010-1234-1234:Bob:classmate |
| Output | Telephone number already exist. |

Case 3: abnormal case

| | |
|--------|------------------------------------|
| Input | add 0000000000000000 |
| Output | Given input format is not correct. |

- Remove a telephone number

Input must be [*Phone number*].

In case the number exists, "Telephone number has been removed."
If not exist, "There's no number to delete."

Case 1: normal case

| | |
|--------|------------------------------------|
| Input | remove 010-1234-5678 |
| Output | Telephone number has been removed. |

Case 2: not exist

| | |
|--------|----------------------------------|
| Input | remove 000-0102-1010 |
| Output | There's no number to be deleted. |

- Create a group

Input must be [*Group name*].

If success, "Group [*Group name*] has been created successfully."

If duplicated, "Group [*Group name*] already exists."

Case 1: normal case

| | |
|--------|--|
| Input | creategroup classmate |
| Output | group [classmate] has been successfully created. |

Case 2: redundancy case

| | |
|--------|----------------------------------|
| Input | creategroup family |
| Output | group [family] is already exist. |

- Show all

Print form,

if exist at least one or more,

[*name*] [*group name*] [*phone number*]

...

If not exist, "There's no member to show."

Case 1: normal case

| | |
|--------|--|
| Input | showall |
| Output | Alice family 010-1234-5678 Bob classmate 010-1234-1234 Charlie club 010-9875-1312 ... |

Case 2: not exist

| | |
|--------|----------------------------|
| Input | showall family |
| Output | There's no member to show. |

- Show group member

Case 1: normal case

| | |
|--------|---|
| Input | showgroup family |
| Output | showgroup family Alice family 010-1234-5678 ... |

Case 2: not exist

| | |
|--------|----------------------------|
| Input | showgroup family |
| Output | There's no member to show. |

- Find

Input must be [*Person name*] with case-insensitive characters.

Output format:

[*Person name*] [*group name*] [*phone number*]

If not exist,

"There's no member to show."

Case 1: normal case

| | |
|--------|---|
| Input | f Alice (or f alice) |
| Output | Alice family 010-1234-5678 Alice lab 010-1423-8756 |

Case 2: not exist

| | |
|--------|----------------------------|
| Input | f SASLKDLFKSDLF |
| Output | There's no member to show. |

- Exceptions

If some commands which should not allowed to do are input,

| | |
|--------|-------------------------|
| Input | asdfasd |
| Output | Command is not allowed. |